

REMARKS

The courtesies extended to the undersigned by Examiner LeGasse during the interview held June 10, 2009 in the subject U.S. patent application are acknowledged and appreciated. Applicant, his principal representatives in Germany, and the undersigned have carefully reviewed the Final Office Action of March 19, 2009 in the subject U.S. patent application, together with the prior art cited and relied on in the rejections of the claims. In response, the claims of the application, in which a Request For Continued Examination (RCE) is being concurrently filed, have again been amended in an effort to more clearly and patentably define the subject matter over the prior art cited and relied on. As discussed with Examiner LeGasse, it is believed that the claims now pending in the subject application are patentable over that prior art, taken either singly or in combination. Reexamination and reconsideration of the application, and allowance of the claims is respectfully requested.

As set forth in the Substitute Specification, and as discussed with Examiner LeGasse, the subject invention is directed to an optical system that is usable to form an illuminated pattern on a material which in motion. The material on which the illuminated pattern is being formed is typically a printed web or sheets that are being printed as stocks and bonds; i.e. as high quality printed products. The illuminated pattern is detected by a detection device, such as a CCD device, for the primary purpose of inspecting the quality of the printing which has been imprinted on the web or sheet. Since the products being printed are typically stock certificates or bonds, it is quite important that the printing be of the highest quality.

As may be seen in Fig. 1 of the drawings, the imprinted material 03, whose surface 02 has been printed, is caused to move in a movement direction 04. A suitable source of illumination is used to form an illuminated pattern 01 on the surface 02 of the imprinted material 03. That pattern 01 is typically in the form of an illuminated strip which has a width B01 in the movement or transport direction of the material 03. The use of an illuminated strip, as opposed to a point or a line, allows the detection device to have a better view of a bigger area of the imprinted material.

The web of material 03 is traveling in the transport direction 04 at a high rate of speed, which can be varied as a function of a variety of factors such as the type of material being imprinted, the complexity of the printing, the type of inks being used, and the like. As is discussed at paragraph 0062 of the Substitute Specification, this transport speed can be in excess of 3 meters/second or greater than 6.7 miles per hour. A sheet printing press may be operated at a speed of 15,000 sheets per hour. Since the speed of the material is variable, the time that each area of the material to be imprinted is under the detection device will also vary. It is thus very important that the detection device always "sees" the same level of illumination, regardless of the movement or travel speed of the material being inspected. It is thus one of the aspects of the subject invention that the amount of time that the illumination arrangement is turned on is controlled as a function of the transport speed of the web of material or sheets of material. This is necessary so that the detection device will "see" a constant amount of light. The Examiner is requested to review the discussion at paragraph 0063 of the Substitute Specification in this regard. This illumination of the surface of the

material with the same amount of light, regardless of the speed of the moving material, is also discussed in detail at paragraph 0016 of the Substitute Specification.

The time that the detection device is turned on must be coordinated with the duration of the time that the light source or sources of the illumination device is or are turned on. Clearly, it is important that all of the constant amount of light, with which the material is illuminated, must be detected by the detection device in order for the detection device to process the provided information. It will be of no value to provide the same amount of illumination, at a constant brightness, and which is independent of the transport speed of the material, if the detection device is turned off.

As may be seen quite clearly in Fig. 16, the detection device, whose timing is indicated by the upper line, has a length of exposure time t_1 and an off time t_2 . The off time t_2 is a function of the speed of the moving material, as is set forth in paragraph 0066 of the Substitute Specification. Since the off time is a function of the speed of the moving material, the on time of the detection device is spaced between off times of the detection device. Again, this is depicted by the top line of Fig. 16.

The light source has a switched-on time that is identified as t_3 in the second or middle line indicated in Fig. 16. As discussed above, it is imperative that the lighting switched-on period t_3 fall within the length of exposure time t_1 of the detection device. There is no benefit if the light is on but the camera is off. Each light source has a finite delay time between the instant that power is supplied to the light source, and the time that the light source starts to produce illumination. This switching-on delay time t_4 is a function of the specific light source, is a known amount of time, and is discussed in paragraph 0066 of the Substitute Specification. In order to insure that the material is

properly illuminated so that a constant amount of light will be used to illuminate the surface of the material, regardless of its speed of travel, in accordance with the present invention, it is required that the sum of the finite length light source switching-on delay time t_4 and the lighting period t_3 of the illumination arrangement be completely within, and shorter than the length of exposure time t_1 of the detection device. This is what is depicted in the top two lines shown in Fig. 16. As was discussed with Examiner LeGasse, the above-discussed features of the present invention have been more clearly set forth in currently amended claim 21, which, as will be discussed in detail subsequently, is believed to be patentable over the prior art cited and relied on, taken either singly or in combination.

In the Final Office Action of March 19, 2009, claims 21, 23, 28 and 31 were rejected under 35 USC 103(a) as being unpatentable over US Patent No 6,175,107 to Juvinal in view of US Patent No 6,480,280 to Hinata and further in view of US Patent No 4,280,624 to Ford. Claims 21, 25-27, 29, 30 and 35-38 were rejected under 35 USC 103(a) as being unpatentable over Juvinal in view of US published patent application No 2001/0054680 to Lindner and further in view of the Ford reference. Claim 24 was rejected under 35 USC 103(a) as being unpatentable over Juvinal in view of Lindner and Ford and further in view of US Patent No 5,591,899 to Griesbeck. Claims 32-34 were rejected under 35 USC 103(a) as being unpatentable over Juvinal in view of Lindner and Ford and further in view of US Patent No 7,012,382 to Cheng. Claim 72 was rejected under 35 USC 103(a) as being unpatentable over Juvinal in view of Lindner and Ford and further in view of US published patent application No 2002/0171754 to Lai. For the reasons to be set forth below, and as discussed with

Examiner LeGasse during the interview of June 10, 2009, it is believed that none of these references, taken either singly or in combination, render unpatentable the claims which are currently pending in the subject US patent application.

US Patent No 6,175,107 to Juvinal is directed to a device that is usable to inspect the neck or finish region of bottles. As may be seen in Fig. 1, the sealing surface 20 of a bottle 12 is illuminated by a first light source 14 and also by a second light source 22. These two light sources are different from each other with the first light source 14 being an LED device and the second light source being a laser light. Both light sources are reflected off the bottle sealing surface 20 and are captured by a camera 24.

There are several important differences between the device shown in the Juvinal reference and the subject invention, as recited in currently amended claim 21. Initially, in Juvinal, the bottles are typically stopped while they are being inspected. Note the discussion at Column 5, lines 19-21 in this regard. The two light sources are used to illuminate the sealing surface 20 in a sequential or alternating fashion as discussed at Column 3, lines 34-36. This results in the obtaining of first and second two-dimensional images of the portion of the container. These images can be compared to detect flaws in the sealing surface 20 of the bottle.

There is no discussion or suggestion in Juvinal of the provision of an illuminated strip having a strip width in a transport direction of the bottles. There is also no discussion of providing a constant amount of light to the detection device independently of a variable transport speed of the material; i.e. the bottles. Since the individual bottles are stopped or are rotated at a constant speed during their inspection, there is no

reason to control the switched-on time of the illumination arrangement to provide the constant amount of light.

Several of the assertions made in the Final Office Action, with respect to the alleged teachings of the Juvinal reference do not appear to be accurate, based on a careful reading of the reference. It is set forth that Juvinal discloses a light source chronological behavior that includes a light source switched-on time light, a light source delay time immediately preceding the light source switched-on time and a light source switched-off time. The reproduction of Fig. 7 of Juvinal at page 5 of the Detailed Action is relied on for support for this position. The undersigned respectfully disagrees.

Initially, it is to be noted that the two vertical lines alleged to indicate a "time delay" and the double-headed arrow are not part of the Juvinal disclosure but have been added by the Examiner. As discussed with the Examiner, the light source switching-on delay time is a recognized characteristic of individual light sources and is the finite amount of time that transpires between the time the light is activated and the time the illumination commences. The Juvinal reference mentions, at Column 2, line 04, that the light sources are sequentially and alternately energized. There is no discussion of any type of light source switching-on delay time. The depiction at Fig. 7 of Juvinal shows the illumination time of the LED light source 14 at a time within the first frame 1 of the camera. There is no specific light source switching-on delay time depicted or suggested in the Juvinal reference and specifically in Fig. 7 of the Juvinal reference. The depiction of Fig. 7, with respect to both the LED light 14 and the laser light 22 is that each has an on time and an off time.

In contrast, as seen in Fig. 16 of the subject application, and as discussed in the Substitute Specification, there is a finite length light source switching-on delay time t_4 and a specific length light source switched-on time. As indicated above, both of these times are set forth in the Substitute Specification. The sum of both of these times is less than the detection device exposure time t_1 . Both times t_3 and t_4 are completely within the detection device exposure time t_1 . As discussed above, it would make no sense to have a portion of that time, and especially the switched-on time length t_3 to fall outside of the exposure time of the detection device t_1 . The discussion of the Juvinal reference, in the Office Action of March 19, 2009 is thus incorrect in this respect.

In the discussion of the Juvinal reference, it is also asserted at point 4 on page 3 of the Detailed Action that "...said detection device off time length being set as a function of said transport speed of said material 12..." The undersigned cannot find any support in the Juvinal reference for that assertion. In Juvinal, the "material 12"; i.e. the bottles are stopped for inspection, as discussed at Column 5, lines 19 and 20. The Juvinal reference merely discusses providing a frame time of the camera 24. No discussion can be found in the reference of any variance of time between successive frames of the camera, or of the detection device off time length being set as a function of the transport speed of the material. Since that speed is essentially zero during the inspection of the bottle sealing surfaces 20, it is not understood how such a variance would be possible.

It is asserted in the Final Office Action that the light source switched on time and the non-existent light source delay time are less than the detection device exposure time length. Since, as discussed above, there is no light source delay time, this

statement cannot be correct. In Juvinal, the light is either on or it is off. The light on time, which for the LED light is the elevated portion of the line underlying the number "1" in the identifier "FRAME 1" is clearly less than the Frame 1 line. However, there is no discrete light source switching-on delay time disclosed in Juvinal. Therefore, there cannot be a time sum of the light on time length and the non-disclosed light source delay time length that is less than the detection device exposure time length, Frame 1.

In the discussion of the Juvinal reference, it is asserted that the detection off time is inherently set as a function of the speed of the conveyor. Again, this conclusion is not supported by any statement or discussion in the reference. In Juvinal, it is disclosed that the Frame 1 time is set to coincide with the strobing of the LED light 14. The Frame 2 line is set to coincide with the laser 22 strobing or on time. There is no discussion in Juvinal of any selection of the detection device off time as being inherently set as a function of the speed of the conveyor. In Juvinal, the bottles are not traversing the light sources while they are being inspected. They may be rotating but they are not traversing.

The secondary reference to Hinata, US Patent No 6,480,280 was cited as showing the provision of a plurality of light sources. That characterization of the Hinata reference is not questioned. It is to be noted however, that Hinata, which is also directed to a bottle neck inspection device, does not supply any of the teachings of the subject invention, as recited in currently amended claim 21, that are missing from the Juvinal reference. In Hinata, the bottles are rotated about a central vertical axis as each one is inspected. This rotation is accomplished by the use of a bottle rotating roller 6 and a cooperating bottle receiver roller 5, both of which are shown in Fig. 3.

There are provided a plurality of light emitting devices 11 and a plurality of light receiving devices 12, as seen in Figs. 2 and 3. However, as discussed at Column 6, lines 56-58, the bottle 7 to be inspected is "...rotated intermittently to the rotation direction shown at 8." It is clear that the Hinata reference does not provide the teachings of the subject invention which are missing from the Juvinal reference.

The assertion in the Office Action, at the fourth full paragraph on page 4 of the Detailed Action, is not relevant to the subject invention, as recited in claim 21. The use of the plurality of light sources in the Hinata device may increase the amount of light reflecting off the bottle neck thus improving the quality of the image obtained by the detector. Our invention varies the light-on time to provide a constant amount of light on the material regardless of the transport speed of the material. The two are not the same.

The reference to Ford, US Patent No 4,280,624 was cited as allegedly showing a device in which the speed of the conveyor can be varied, relying on Column 2, lines 65-68 and Column 3, lines 1-5. As discussed with Examiner LeGasse during the interview, the Ford device is again directed to a bottle inspection device in which the spacing between succeeding bottles moving along a moving conveyor 3, as depicted in Fig. 1, is increased to separate the bottles while they are individually inspected. Each bottle is engaged by a helical feed screw 4 which increases its speed of travel so that each bottle is separated from succeeding bottles. The bottles then pass by the two lamps 10 at a constant rate during the inspection process. The spacing of the bottles is maintained as they travel through the inspection station 2, as recited at the top of Column 3. Once each bottle has been inspected, it is again engaged by a second

helical feed screw 7. The second feed screw is the inverse of the first and functions to again reduce the spacing between adjacent ones of the bottles.

The combination of Juvinal, Hinata and Ford does not render obvious the device as recited in currently amended claim 21 for all of the reasons set forth above. Claim 21 is believed to be patentable over this combination of references.

Claim 21 was also rejected over Juvinal in combination with Ford and substituting the Lindner reference for the Hinata reference. As discussed during the interview, that substitution of references does not provide any better teaching of the subject invention, as set forth in currently amended claim 21. In the Lindner reference, there is again described a bottle inspection device. In this instance, the light intensity of a plurality of LED devices is varied as a function of the transparency of each bottle. A sensor 1 is situated upstream of the LED light screen D. Once the transparency of each bottle is sensed, the illumination level provided by the LED array D can be varied. It is noted that the light field provided by the LED array moves with the individual bottle as it passes by the light screen D. The Lindner reference, while it clearly shows an illumination device having a plurality of LED elements, does not add anything that is missing from the Juvinal and Ford combination. Accordingly, claim 21, as amended, is also believed to be patentable over the Juvinal, Lindner and Ford combination of references.

The language of claims 28 and 31 have been added to currently amended claim 21. It is believed that these features are not shown or suggested in the prior art. Claim 28 recited the provision of an illuminated strip as forming the illuminated pattern. Claim 31 recited control of the light source switched-on time length as a function of the optical

properties of the material to be illuminated. Neither of these features is believed to be shown in the references. In Hinata, which was relied on in the rejection of claim 28, it was asserted that 3 is an illumination strip. In fact, 3 is indicative of light emitting lines from the light sources 1. There is no depiction of an illuminated strip having a strip width and a strip length. With respect to claim 31, it is asserted that it is common knowledge to vary the light switched-on time depending on the material being illuminated. This assertion, with no support in any of the references, is not believed to be credible.

All of the rest of the dependent claims now pending in the subject application are believed to be allowable because of their dependency on believed allowable currently amended claim 21. These claims are all directed to features which, in combination with the features set forth in currently amended claim 21, are not shown or suggested in the prior art.

The several additional references cited as showing various features of selected ones of the dependent claims have been noted. It is believed that their disclosures do not provide the teachings which are missing from the references cited and relied on in the rejection of claim 21. No further discussion of these secondary references is believed to be necessary.

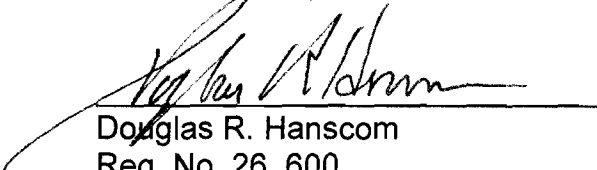
SUMMARY

Independent claim 21 is being amended to more clearly patentably define the subject invention over the prior art cited and relied on. A Request For Continued Examination (RCE) is being filed concurrently herewith to provide the Examiner with sufficient time to consider the arguments contained herein. It is believed that the claims now pending in the subject application are patentable over the prior art cited and relied on in the rejections of the claims. Allowance of the claims, and passage of the application to issue is respectfully requested.

Respectfully submitted,

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